

QUAD ELECTROSTATIC LOUDSPEAKER

Service Data

The Acoustical Manufacturing Co. Ltd
St Peters Road, Huntingdon, Cambs. PE18 7DB, England
Telephone 0480 52561 Telex 32348 QUAD G

Contents

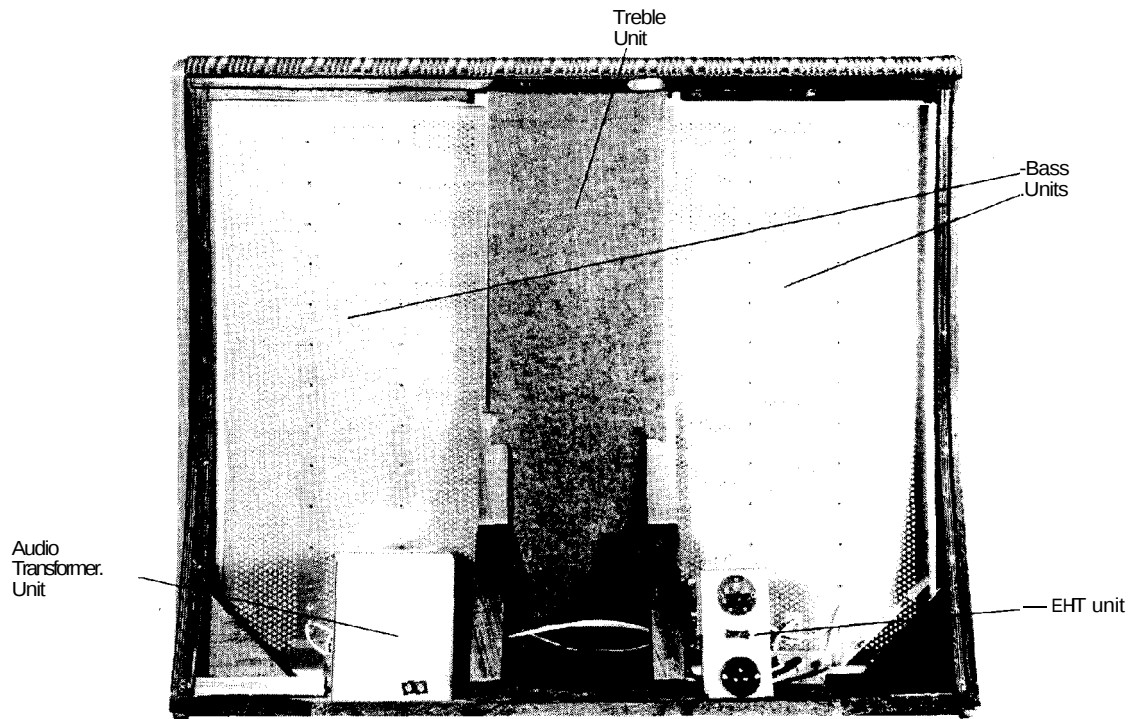
	<i>Page</i>
General	1
Loudspeaker Unit identification	1
Fault Diagnosis	1
Dismantling the Speaker	2
Reassembling the Speaker	3
Fitting new dust covers	3
Modifications	4
Components List	5
Circuit Diagram	6

QUAD ELECTROSTATIC LOUDSPEAKER SERVICE DATA

General

The notes in this section are for the guidance of the engineer who has some experience of carrying out repairs to these speakers together with the necessary proper materials for the repair

The QUAD electrostatic speaker consists of five components two bass units one treble unit an audio transformer unit and an EHT supply unit. If any repairs are necessary, it should be ascertained which of the five components is the cause and that component should be either replaced complete or repaired as appropriate



Fault Diagnosis

Loss of Sensitivity

Check the EHT voltage which should be Bass 6Kv $\pm 7\%$ Treble 1.5Kv $\pm 7\%$

If low check by disconnecting whether due to leakage in speaker unit or fault within EHT unit. Voltages must be checked only with electrostatic meters as the current drawn by other types may itself damage the rectifiers

Distortion

- 1 Make sure that the speaker is really at fault by comparison with a second electrostatic speaker using a QUAD amplifier
- 2 Check EHT voltage
- 3 Suspect intermittent breakdown in speaker units
- 4 Suspect intermittent breakdown in audio transformer unit (Note a fault in this unit is very unlikely)

No output at all

Suspect EHT unit or audio transformer unit after checking more obvious things like external connections not forgetting the leads under the transformer unit connecting the input sockets

Background Noise

One cause of background noise in the electrostatic loudspeaker is internal discharge of the EHT supply at times of high humidity or high voltage or both. This may be reduced by lowering the EHT voltage and a tap is provided on the EHT mains transformer for this purpose

Before the EHT unit is touched the mains should be completely disconnected and the loudspeaker left to stand for two hours to ensure it is completely discharged

The connections to the EHT rectifier block are normally taken from tags marked Common and 610V. The latter is the righthand end tag and next to it is a blank tag marked 590V to which should be transferred the lead normally connected to the 610V tag. Background noise may also be caused by discharge of the EHT from points external to the loudspeaker units at the tags on the rectifier block for example if a hair of felt or piece of fluff comes in reasonably close proximity to that point or if a spike of solder or sharp point of wire permits corona discharge

QUAD ELECTROSTATIC LOUDSPEAKER SERVICE DATA

Where EHT leakage occurs via a bass unit this is sometimes found to be discharging from one of the eyelets around the periphery of the bass unit plates probably to one of the aluminium brackets. In such cases a satisfactory repair can be effected by slitting the polythene tape round the edges of the unit opening the dustcover frames and insulating the leak by applying a single layer of similar polythene tape all round the periphery of the internal plates on top of the existing sealing tape and reassembling the dustcovers again with polythene tape.

Other internal failures of insulation will probably necessitate replacing the loudspeaker unit affected.

Mechanical

If the dust seal covers should be torn, it may be necessary to replace the complete unit as there will have been ingress of dust which causes loss of sensitivity of the unit concerned.

Dismantling the Speaker

The loudspeaker should be switched off for about two hours before the grilles are removed so as to ensure the EHT unit has completely discharged.

The component loudspeaker units of the QUAD electrostatic loudspeaker must be handled with the utmost care partly because when not supported by the rigid frame of the cabinet they are more liable to physical distortion which would reduce the small internal clearances and partly because the dust covers are necessarily made of very thin and therefore fragile plastic film.

At the rear of the treble unit are four pins located in the wooden struts of the cabinet and as these represent an additional hazard to the dust covers of the treble unit the positioning of this unit requires particular care. Soldered joints should be smoothed and rounded and all spikes of solder wisps of wire etc removed as these would tend to cause arcing at the high internal voltages used.

Removing Front and Rear Expanded Metal Grilles

The rear grille is held only by the screws around its periphery. For the front grille it is necessary first to remove the side mouldings, the staples through the metal beneath them and the screws under the baseboard. Then the bottom edge of the grille is lifted gently outwards and upwards until the top rear edge may be slipped out of its groove in the cabinet when the whole grille will be free. Care must be taken not to strain the top curved section during removal or the metal may split.

Replacing the Front Grille

Replacement grilles are normally supplied cut and partly preformed so the procedure is as for refitting an existing grille. It may be found helpful when working single handed having inserted the top back edge of the sheet into the slot in the cabinet to hold the bottom edge of the grille under slight tension to the bottom of the wooden frame by means of elastic bands and simple hooks of wire such as an opened paperclip and then to use a bar of wood slightly longer than the width of the sheet and with a good flat face to bed the grille to the frame by moving the bar progressively down the face of the grille tacking the sides as you go finally securing the bottom edge with the screws removed from the old grille. Do not forget to fasten the earthing lead to the grille.

Replacing Bass and Treble Units

- 1 Remove both grilles
- 2 Remove the top and bottom aluminium brackets in front of the centre (treble) unit
- 3 If the treble unit is to be replaced it should now be disconnected from the audio transformer (the large rectangular can on the left-hand side when viewed from the rear). This is held in position solely by four screws whose heads are accessible below the baseboard of the speaker. If the speaker is tilted to provide access to slacken these screws it must be restored to its upright position before they are removed or the transformer will have no support other than its connecting wires.
- 4 Carefully prise out one bass unit and slide it past the front of the treble unit until the outer edge clears the remaining bracket at top and bottom of the cabinet.
- 5 Either disconnect and remove the bass unit or this has to be replaced or move it far enough to enable access to be obtained to the treble unit as required. To remove the treble unit ensure it is free of the four pins mentioned on page 2 then slide it sideways into the space vacated by the bass unit already moved and lift it out.

EHT and Audio Transformer Units

Only the rear grille need be removed to provide access to these units. Both are secured by screws through the base board only and if the speaker is tilted to obtain access to these screwheads it must be restored to the upright position before the screws are removed or the unit will have no support other than its connecting wires.

Place a sheet of cardboard behind the unit to be worked on to protect the thin plastic dustcover of the bass unit from accidental damage due to specks of solder or wire ends etc.

Note and mark the flexible connections to the unit to be worked on so as to ensure correct reconnection.

To replace the rectifier block of the EHT unit undo the two 4BA nuts securing it to the framework of the EHT unit and remove it. If the replacement block is found to be of a different type it will still be electrically and physically interchangeable with the earlier type and the equivalent connections are shown in Fig. 1. If the leads to the loudspeaker units have to be extended the joints should be insulated with high voltage sleeving and staggered so that two joints do not lie together.

To remove the Audio Transformer after having removed the four securing screws invert the transformer and unsolder the wires.

QUAD ELECTROSTATIC LOUDSPEAKER SERVICE DATA

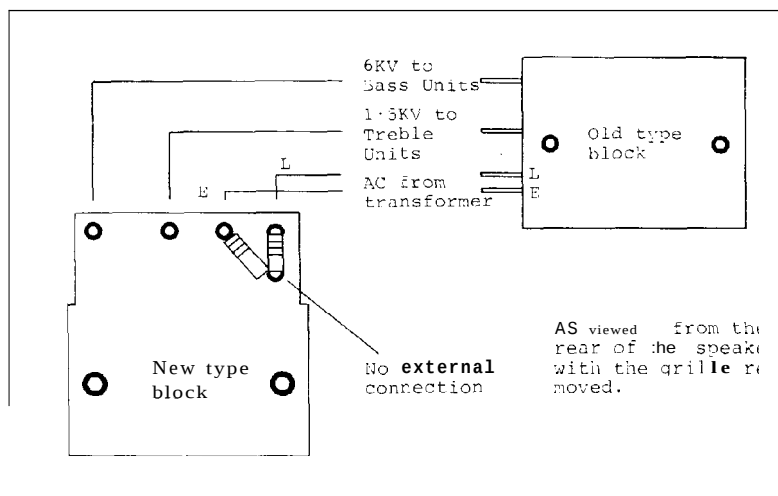


Fig 1

Reassembling the Speaker

To reassemble the dismantling procedure is reversed but in addition it will be necessary to remove any wrinkles which may have appeared in the treble unit's front and rear dust covers as these will produce audible rattles when the speaker is in use. This is achieved by means of gentle heat which thermosets the plastic film and may most conveniently be applied by means of a small warm air blower, such as a hand-held dryer. The nozzle should be held about 25mm from the dust cover and moved up and down the unit as uniformly as possible at a speed of about 75mm per second in regular lines so as to cover the whole area. Repeat until all wrinkles have disappeared but always treat the whole area and do not tackle individual wrinkles separately. A certain amount of skill is required in this operation. Obviously if the nozzle is not close enough and/or the speed of travel too great there will not be enough heat to affect the cover. On the other hand too much heat at one point can quickly burn a hole. When carrying out this process for the first time, progressively reduce the distance and speed until the desired results are obtained.

Heat should not be applied to the bass unit covers. Any slight wrinkles in these covers will rarely have any audible effect and will in any case normally disappear as the tensions even themselves out in a few days.

After thermosetting the treble unit dust covers the damping felts behind the treble unit must be stretched and fixed so that there is no contact between them and the treble dust cover as this will also affect reproduction.

Fitting New Dust Covers

Note: The plates and dust cover material acquire a static charge and if placed in a dusty atmosphere or near any accumulation of dust it will adhere to them, with deleterious effects. Only plastic film supplied by Acoustical should be used. Specify whether for bass or treble unit when ordering.

First remove the faulty unit from speaker as described on page 2 and strip the adhesive tape from around its edges to release the two dustcover frames. On bass units carefully disconnect the three wires from the terminal board having noted their positions, and remove the board. Clean all loose dustcover material from the wooden frames since any pieces left to flap will buzz.

If the bass or treble unit is to be left without dustcovers for any length of time it should be kept in a dust free environment. Spread enough of the new dust cover material on to any clean solid flat surface to leave about 150 mm surplus all around the frame and hold in position with pieces of adhesive tape at each corner and at intervals along the sides as required.

The materials should not be over stretched but just tightly enough to remove the wrinkles.

Adhesive can now be applied to the frame the frame placed into position on the material and left to dry. The adhesive should preferably be of a type which does not set brittle such as Samuel Jones Samson C203 Evostick etc.

When this is dry, use a razor blade to trim off all surplus cover material back to the edge of the frame.

The holes to the terminals should be BURNT through the film with a small soldering iron. If pierced cold the material will in time split and run the whole length of the dust cover.

When a pair of covers have been made the unit and the covers should be blown with a jet of dry air to remove any dust particles etc which have adhered to them as this will cause a loss in sensitivity.

GREAT care should be taken if it is found necessary to renew any soldered joints on the plates. Anything more than a quick touch to the tags will soften the plate material and loosen the solder tag. A heat sink is helpful here.

When reconnecting to the terminals be sure not to cross wires as this will result in the failure of the speaker to work.

The unit should be replaced between the two frames and sealed with 50mm wide polythene adhesive tape all around the outside edge of the frames as before.

This completes the recovering and the unit can now be reassembled into position in the speaker.

QUAD ELECTROSTATIC LOUDSPEAKER SERVICE DATA

Modifications

1 At serial number 16800 (March 1966) additional filtering was added to protect the treble unit from damage due to high level low frequency signals. Earlier speakers may be modified as described below when they are to be used with the Quac 303 or other suitable amplifiers of comparable output.

The components required can be obtained ready assembled on a tagboard if required and Fig 2 shows this in position under the audio transformer. Alternatively suitable resistors and capacitors from normal servicing stocks may be used if preferred.

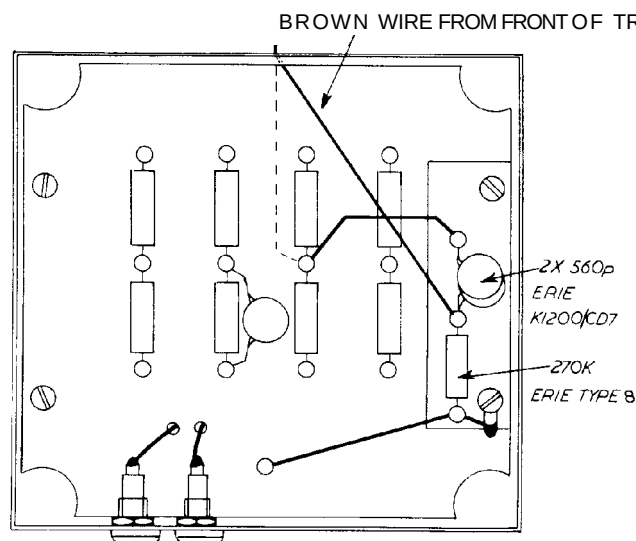


Fig 2

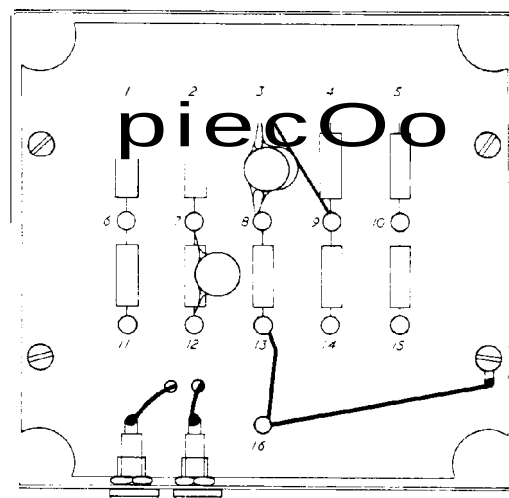


Fig 3

Fig 3 shows the tagboard layout from serial number 16800 onwards.

Modification procedure for loudspeakers earlier than serial number 16800 when used with the Quad 303 amplifier:

- Remove the AC supply from the speaker and allow two hours for the EHT to discharge.
 - Undo the screws all around the periphery of the rear grille and remove the grille.
 - Tilt the loudspeaker to permit access to the underside of the baseboard. Take great care not to dent the front grille.
 - Remove the four screws holding the audio transformer (large can on the left hand side) in place, remembering to support the transformer before it is freed or it may slip and damage the left hand bass unit dustcover.
 - Restore the speaker to an upright position and invert the audio transformer, taking care not to strain its external wiring.
 - Remove the two drive screws on the right hand side of the tagboard and use these to secure the small tagboard supplied as shown in Fig 2.
 - Rewire as shown, ensuring that the brown lead which has to be stretched to reach its new anchor point does not press against any sharp edges of turret lugs or solder.
 - Reassemble the speaker in the reverse order of operations (a) to (e).
- 2 Voltage selector and voltage selector socket changed. Old types no longer available. New type Stock No's: Selector - SV5049A, Select socket - SVB9AAA. The two types are not interchangeable.
- 3 At Serial No 44000 the A.C. supply voltage plug and socket changed.
 Stock No's: ESL up to Serial No 44000, plug - PP1403A, socket - PS18621.
 Stock No's: ESL after Serial No 44000, plug - PPP579A, socket - PSP587A.
- 4 At Serial No 45590 supply indicator neon changed.
 Stock No's: ESL up to Serial No 45590 - BNSL50R.
 Stock No's: ESL after Serial No 45590 - BNT430R.
 The two types are not interchangeable.

COMPONENTS LIST

Components and circuit detail may vary slightly depending on the age of the equipment. In case of doubt please refer the query to Acoustic.

Assembly Qel speakers E/ Speaker components list

Part No.	Description	
BNSL50R	Neon SL50 Red	
BNT430R	Neon Type T430 Red	
PP1403A	Plug 3 pin AC SA1403	Use on ESL up to Serial No 44000
PP579A	Plug 3 pin AC Euro	Use on ESL after Serial No 44000
PP378AO	Plug L378A/4 6 jack 4mm	
PP378A2	Plug L378A/4 Red 4mm	
PS13180	Socket 4mm L1338 Black panel	
PS13182	Socket 4mm L1318 Red panel	
PS18621	Cable end skt 3 pin AC	round AC input connector use an ESL up to Serial Nos 44000
PSP587A	Skt P587 AC cable	Use on ESL Serial No 44000 and over
OELBAPA	Quad ESL bass unit	
OELCONA	ESL mod kit	Fit to speakers Serial No 16800 and below when used with amplifiers of greater output than the Quad II
QEL	ESL aluminium bracket	
QELFGPK	ESL front grille - Black	
QELFGPZ	ESL front grille - Bronze	
QELHTPA	ESL EHT unit	
QELHTPC	ESL EHT unit - Canada	
QELHTPS	ESL EHT unit - Sweden	
QELHTTD	EHT unit Demko	
QELLAPA	ESL audiotransf	
OELLEGA	ESL legs set	
QEILMPA	ESLAC supply transf	
QELREPA	ESL rectifier block	
QEIRGPA	ESL rear grille	
QELSIPA	ESL side rails	
QELTRPA	ESL treble unit	
SV5049A	Voltage selector T5049	
SVB9AAA	Voltage selector skt	
EFMYO6A	Treble unit dustcover material	
M11078A	Treble unit dustcover frame	
EFSA5OA	Bass unit dustcover material	
M11079A	Bass unit dustcover frame	
IBELBAA	Bass unit terminal board	
FP2630A	Bass unit terminal	
C560PMI	Capacitor 560p	
R150KKA	Resistor 150K 10% Type 8	
R180KJB	Resistor 180K 5% Type 8	
R270KKA	Resistor 270K 10% Type 8	
IP1401B	Polythene tape 50mm	

